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The future of commodity prices and the pandemic-driven global recession: Evidence from 150 years of data

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ABSTRACT

The pandemic-driven global recession has already triggered a rapid decline in global commodity prices, particularly of energy products. This is taking place on top of a downward trend in commodity prices that was already underway. Yet it remains unclear how long this decline will last given the uncertainty about the global recession. In this comment, we provide an overview of evidence using 150 years of data on commodity prices and global output. Commodity prices have experienced trends as well as four long-term cycles ("super cycles") since the late 19th century, with the latter dependent on world demand. Although recent trends have been diverse, the two recent super cycles have been synchronized. The last one started at the turn of the century and had its peak in the early 2010s. Future trends would be determined by the weakness of global aggregate demand, changes in the global energy economy to mitigate climate change, and the weight of sub-Saharan Africa population on tropical commodities.

1. Introduction

Natural resources provide the essential inputs of economic development for a large number of countries. The global recession generated by the coronavirus pandemics has been reflected in a strong reduction in global trade and a rapid decline in some commodity prices, notably of energy products. An important question is how long this fall in commodity prices will last, given that the pandemic-driven decline in economic activity has been very strong and may have long-term effects? On top of that, how will changes in global energy economy to mitigate climate change affect oil prices and the price of metals required to produce renewable energy? These questions matter not only for commodity producing firms, but also for a large number of commodity-exporting developing countries, particularly in Latin America and Sub-Saharan Africa[1].

To answer these questions, we take a long historical view. In our earlier research, and based on price data since 1865, we have shown that global commodity prices have undergone three long-term cycles or "super-cycles" with periodicities of 30–40 years, and are in the midst of a fourth one (Erten & Ocampo, 2013a). These cycles are driven primarily by changes in global demand, and show a strong co-movement across different commodity groups during the two recent cycles but not during the previous ones.

Since the current downward phase had not begun yet when we finished our earlier research, it was not possible to discern the peak of the fourth cycle. Now we can document precisely the peak year, and show the degree to which it was driven by the weakening in global economic activity. Determining the turning point in the super cycle is crucial for predicting the future trajectory of energy and non-energy prices, and to draw lessons for policies conducive to sustainable development.

2. Looking back

Our non-oil commodity price series covers major industrial metals, tropical agricultural goods, and temperate zone (or non-tropical) agricultural goods (Grilli & Yang, 1988, Ocampo & Parra, 2010). It is deflated by the manufacturing unit value index to capture real price changes. We updated this price index up to 2018 for this paper.

Fig. 1 and Table 1 display the decomposition of real non-oil commodity prices into several cyclical components using the band-pass (BP) filter approach –a statistical method that does not impose any commitments to a particular statistical model

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[1] See Erten and Ocampo (2013b) for global implications of declining commodity prices, with a particular focus on developing economies. For a more formal analysis, see Erten and Tuzcuoglu (2018).

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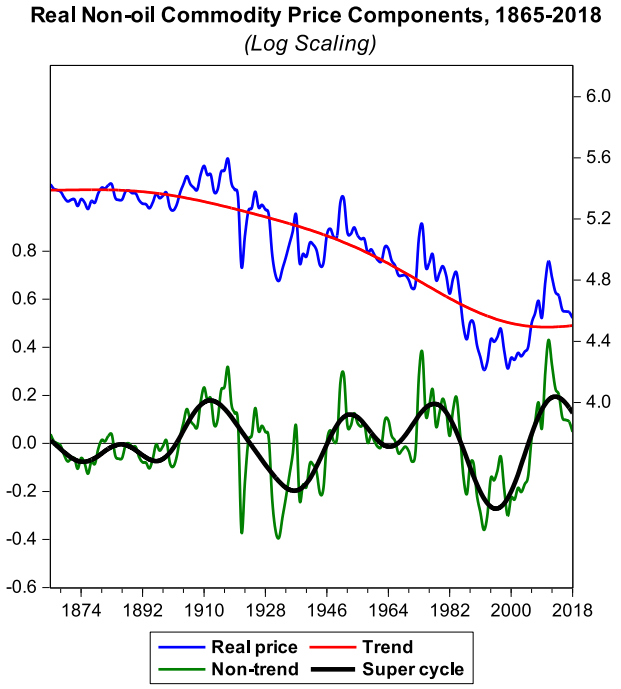

Fig. 1. This figure shows the decomposition of real non-oil commodity prices into a long-term trend, a super cycle, and a short-term cycle component, using the asymmetric Christiano & Fitzgerald (2003) band-pass filter. For details on the data sources and methodology, please see text.

(Christiano & Fitzgerald, 2003).[2] The top section of Fig. 1 shows the natural logarithm of the real non-oil commodity price series and its long-term trend. We observe that non-oil prices trended downward from the beginning of 1900s until late 1990s and have exhibited a steady trend since early 2000s.

The bottom section of Fig. 1 shows the non-trend component, or the difference between the price series and the long-term trend. It indicates that there have been three and a half super cycles in real non-oil commodity prices since the late 19th century. The first one took off in the late 1890s, peaked around World War I, and ended around 1930s, displaying strong upward and downward phases. An important driver of this super cycle was rapid world economic growth, led by the United States but also by Western Europe until WWI, followed by a strong slowdown of Western Europe after WWI and then the Great Depression. The second cycle began in the 1930s, peaked in the early post-World War II years, and faded away in the mid-1960s, following a strong upward phase but a weak downward one, thanks to the strong global demand that characterized the post-WWII period until the early 1970s. Beginning in early 1970s, a third long cycle reached its peak around mid-1970s, and came to an end in the late 1990s. This cycle displayed a weak upward phase followed by a strong downward one. The early 2000s marked the beginning of a fourth cycle that peaked in the early 2010s[3], and has been declining since then. The rapid growth of China and its subsequent slowdown has played a major role in generating this final super cycle, which we are still experiencing.

Fig. 2 shows the broad coincidence but also some differences in trends and cycles across major non-oil commodity groups. First, examining long-term trends, we observe that metals prices began to trend downwards earlier than agricultural prices, declined steadily until the mid-1970s, but show a strong upward swing since then. This is not surprising given the metal-intensive industrialization and urbanization process underlying China's recent economic development. In contrast, agricultural prices do not exhibit an upward trend in recent decades. Second, comparing super cycles, we observe that the behaviour of the aggregate price index resembles that of agricultural commodities more, while the metal prices follow some distinct cycles. Their first cycle ended earlier for metals, around 1921, while the contraction phase of agricultural prices continued one more decade. The second cycle for metal prices took place from 1921 to 1945, which was not displayed by agricultural prices, but the next two cycles appeared to be simultaneous.

Panel B of Fig. 2 provides a comparison between tropical agricultural prices and non-tropical ones. First, the downward trend experienced by tropical prices began earlier, around the 1890s, and continued until the end of the sample in 2018. Non-tropical prices, on the other hand, entered a steady decline only after 1920s, and followed a steady trend in the past couple of decades. These differences confirm the long-held view that the excess supply of labour in tropical agriculture tends to exert downward pressure on prices of tropical goods (Lewis, 1969). Second, we also observe that the super cycles of tropical agricultural prices seem much greater in amplitude compared to non-tropical agriculture.

In turn, Fig. 3 illustrates the price decomposition of crude oil prices into its cyclical components since 1875. Focusing on long-term trends, we observe that oil prices trended upward until 1920s, followed by a slight decline until the 1960s, and a much steeper upward trend thereafter. Therefore, in stark contrast with other commodity prices, oil prices have predominantly followed a strikingly upward long-run trend, whereas others tended to follow mainly downward trends over the past century.

Fig. 3 also shows that the super cycles of oil prices have differences compared to non-oil ones. First, the rise of electrification and automobiles as a new industry since the late 19th century, but also the take-off of oil industry that took place simultaneously, gave rise to a long but small-in-amplitude super cycle for oil prices. The second cycle from about 1947 to 1973 is similar to the post-war cycle in non-oil commodities, although its expansion phase started later. The 1970s oil price shocks gave rise to a third super cycle with large amplitude. The last super cycle followed a sharp expansion phase driven by energy-intensive growth in emerging markets, including China, and reached its peak in 2008 – though prices remained relatively high until 2013 – and have been in the contraction phase afterwards.

The two last super cycles are, therefore, the only ones which are relatively similar for oil and non-oil commodities, but with much stronger swings in oil prices. They are also the ones in which the cycles of three components of our non-oil price index are more similar, though with different long-term trends (Fig. 4).

3. Looking forward

The three factors that are likely to affect global commodity prices are the weakness of global aggregate demand, the major changes that must take place in the global energy economy to mitigate climate change, and the growing weight of sub-Saharan Africa in world population. We focus on each of these factors here.

The links between long term commodity price cycles and those of global demand are shown in Fig. 4, and have also been particularly strong during the last two super cycles. In our earlier research we showed that global demand cycles have historically preceded the super cycles of commodity prices. The current downward phase of prices seems to have preceded the downturn of global demand, but this does not capture the magnitude of the slowdown that has taken place in the global economy since the 2007–09

[2] For details about the decomposition analysis, please see the appendix.

[3] All non-oil price series peak in 2011 but when taking into account the trends, the peak is estimated to be 2013.

Table 1
Descriptive Statistics of Super Cycles in Commodity Prices (from trough to trough).

Non-oil commodity prices				
	1894–1932	1932–1971	1971–1999	1999-ongoing
Peak year	1917	1951	1973	2013
Percent rise in prices during upswing	50.2%	72.0%	38.9%	64.8%
Percent fall in prices during downswing	−54.6%	−43.3%	−52.5%	–
Length of the cycle (years)	38	39	28	–
Upswing	23	19	2	14
Downswing	15	20	26	–
Mean (of the full cycle)	157.3	119.4	86.2	95.2
Metal prices				
	1885–1921	1921–1945	1945–1999	1999-ongoing
Peak year	1916	1929	1956	2012
Percent rise in prices during upswing	105.7%	66.6%	98.0%	141.0%
Percent fall in prices during downswing	−70.2%	−51.9%	−47.4%	–
Length of the cycle (years)	36	24	54	–
Upswing	31	8	11	13
Downswing	5	16	43	–
Mean (of the full cycle)	151.6	95.7	85.2	104.6
Total agricultural prices				
	1894–1932	1932–1971	1971–1999	1999-ongoing
Peak year	1917	1951	1973	2013
Percent rise in prices during upswing	52.8%	90.3%	52.0%	54.2%
Percent fall in prices during downswing	−56.2%	−49.6%	−56.0%	–
Length of the cycle (years)	38	39	28	–
Upswing	23	19	2	11
Downswing	15	20	26	–
Mean (of the full cycle)	163.2	127.0	87.5	93.2
Tropical agricultural prices				
	1891–1933	1933–1972	1972–1999	1999-ongoing
Peak year	1910	1951	1977	2013
Percent rise in prices during upswing	54.5%	116.6%	74.3%	45.9%
Percent fall in prices during downswing	−72.8%	−50.9%	−65.2%	–
Length of the cycle (years)	42	39	27	–
Upswing	19	18	5	14
Downswing	23	21	22	–
Mean (of the full cycle)	170.6	106.7	74.8	96.2
Non-tropical agricultural prices				
	1894–1932	1932–1971	1971–1999	1999-ongoing
Peak year	1917	1951	1973	2013
Percent rise in prices during upswing	119.8%	81.7%	66.1%	58.5%
Percent fall in prices during downswing	−57.4%	−49.5%	−58.0%	–
Length of the cycle (years)	38	39	28	–
Upswing	23	19	2	14
Downswing	15	20	26	–
Mean (of the full cycle)	156.8	138.0	93.8	91.8
Crude oil prices				
	1892–1947	1947–1973	1973–1998	1998-ongoing
Peak year	1920	1958	1980	2008
Percent rise in prices during upswing	402.8%	27.4%	363.2%	466.5%
Percent fall in prices during downswing	−65.2%	−23.1%	−69.9%	–
Length of the cycle (years)	55	26	25	–
Upswing	28	11	7	10
Downswing	27	15	18	–
Mean (of the full cycle)	36.9	24.8	53.2	131.4

Note: This table displays the descriptive statistics of four periods of super cycles identified in the ACF BP filter decomposition analysis.

financial crisis: an annual growth of 2.4% in 2007–2019 vs. 3.0% in 1990–2007, according to the United Nations data. The slowdown has indeed led to a debate on whether the advanced economies are now in a phase of "secular stagnation" –or secular long-term slowdown-, to which the deceleration of the Chinese economy has been added in recent years (Prasad & Wu 2019).

Therefore, as in the past, weak global aggregate demand will exert strong downward pressure on commodity prices. The collapse of economic activity and global trade that is taking place as a result of the coronavirus pandemic will, no doubt, contribute to this result. The latest IMF projections indicate that world GDP at market exchange rates will fall by 6.1% in 2020, with an incomplete recovery in 2021 (IMF, 2020). The advanced economies' GDP fell by more than 10% in the second quarter. Some developing country regions, particularly Latin America, may have experienced a similar shock, but China experienced a recovery in the second quarter after a fall in the first quarter. There is, however, significant uncertainty about the length of the world recession and the speed of the recovery.

One of the strongest effects of pandemic has been the collapse of oil and other energy prices (coal and natural gas). Beyond this conjuncture, the major issue is that the use of fossil fuels will have to strongly decline if the world is to meet the targets set in the 2015 Paris Agreement on Climate Change: a 1.5 °C warming over

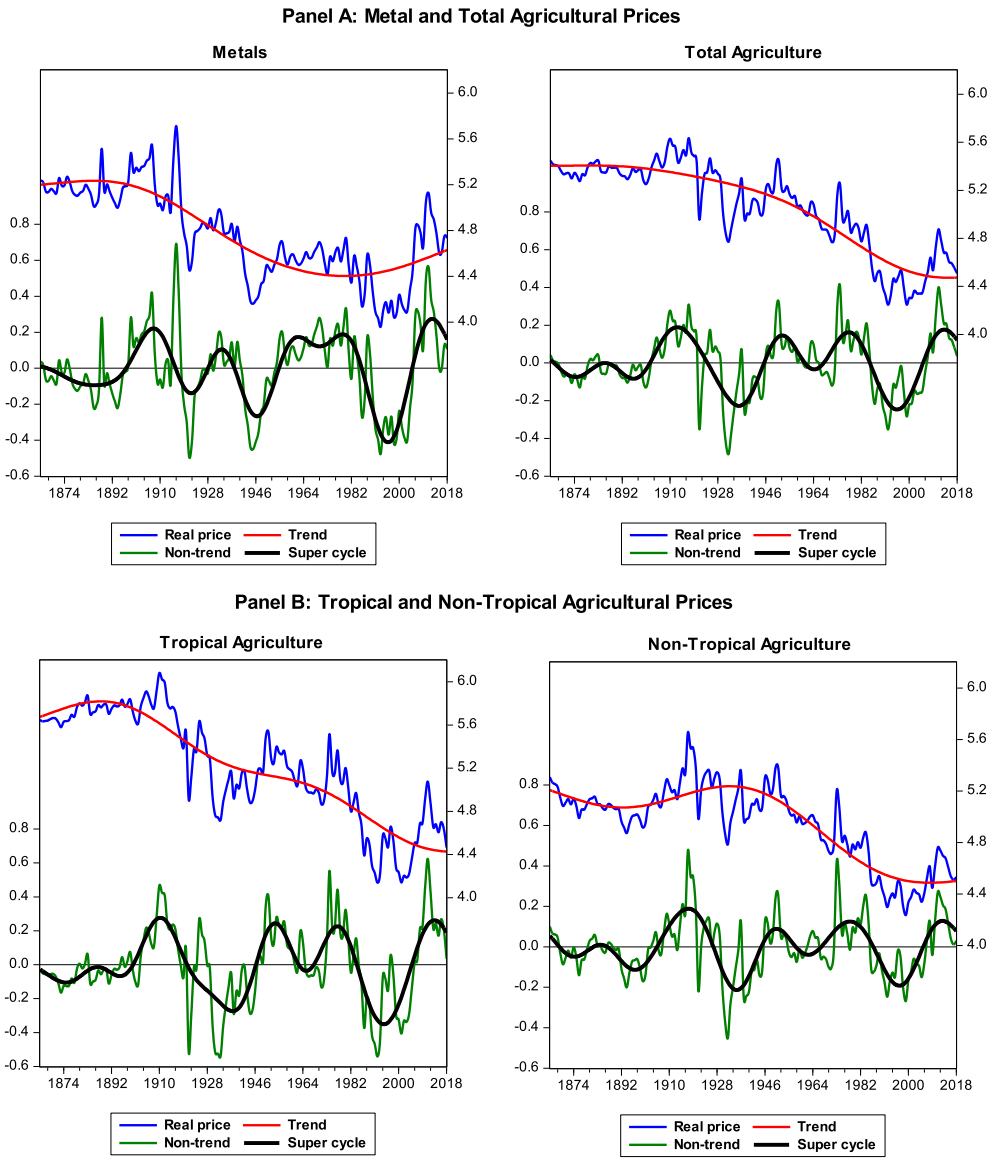

Fig. 2. Panel A shows real price decompositions for metals and total agriculture, and Panel B shows real price decompositions for tropical and non-tropical agriculture. The prices are decomposed into a long-term trend, a super cycle, and a short-term cycle component, using the asymmetric Christiano & Fitzgerald (2003) band-pass filter. For details on the data sources and methodology, please see text.

the pre-industrial revolution levels, and clearly avoiding temperatures over 2 °C above those levels. This implies that the demand for fossil fuels must decrease significantly if the world is going to meet these targets. The Energy Transition Commission (2017, chapter 4) estimates that to achieve the 2 °C target, coal consumption should significantly decline since the 2020s, and oil use should peak in 2020 and start declining heavily since the 2030; only gas consumption could experience a weak increase in demand. This means that coal and oil prices should experience a strong decline. Although current trends in the demand for fossil fuels have not followed this advice, there is growing pressure to meet the Paris targets. Of course, there could be an additional demand for metals associated with growing renewable energy production.

Non-oil commodity prices have experienced diverse trends in 2020, with overall fairly constant prices, within the downward trend they exhibited in recent years. The most important were the decline in base metal prices until April followed by a recovery in recent months, probably driven in both cases by Chinese demand. World Bank projections for the full year indicate that, in contrast to energy prices, non-oil prices will not experience an additional decline (World Bank, 2020). It cannot be discarded, however, that non-oil prices may fall if the world recession lasts longer than currently projected or the world economy exhibits a weak recovery.

It should be finally added that the population boom that sub-Saharan Africa is experiencing will be reflected in the growing supply of labour in that continent. This increase in labour supply, plus the demand for a dynamic export sector to support this region's growth (McMillan & Rodrik, 2014), will continue to negatively affect the prices for tropical agricultural products. It will also support the growth of mining activities in the continent, enhanced by foreign investment, including from China.

Overall, therefore, the downward phase of the super cycle that started in 2014 should continue in the future, with the adverse trend being particularly strong for oil and tropical agricultural commodities. The specific length of the downturn will depend on the duration of the pandemic-driven weakness in global demand, the relative demand changes to mitigate climate change, and the

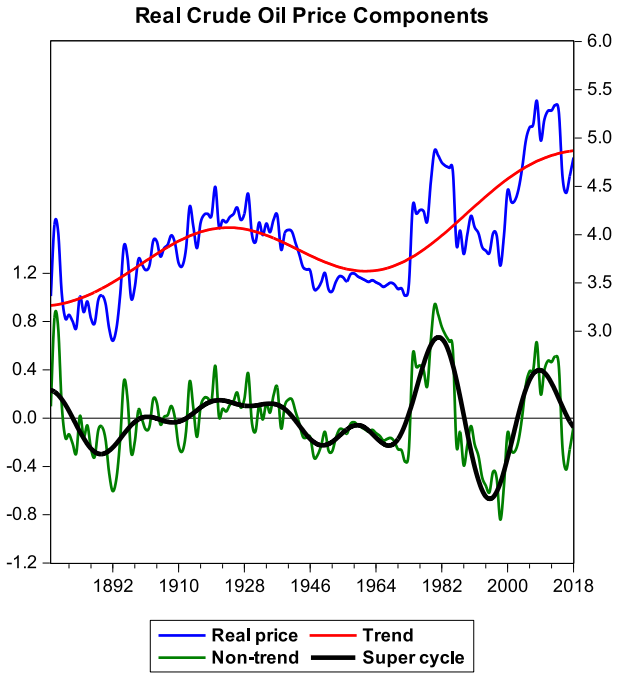

Fig. 3. This figure shows the decomposition of real crude oil prices into a long-term trend, a super cycle, and a short-term cycle component, using the asymmetric Christiano & Fitzgerald (2003) band-pass filter. For details on the data sources and methodology, please see text.

increasing labour force in sub-Saharan Africa. Given this adverse outlook for several commodity markets in the medium run, many developing countries that rely on commodity exports as a major source of growth are likely to experience modest growth prospects in the near future.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Following Cuddington and Jerrett (2008) and Erten and Ocampo (2013a), we use the asymmetric Christiano and Fitzgerald (ACF) BP filter to decompose the natural logarithms of real commodity price indices into three components: (1) the long-term trend (LP_T), (2) the super cycle component (LP_SC), and the other shorter cycle component (LP_O):

$$LP_t \equiv LP\_T_t + LP\_SC_t + LP\_O_t \tag{1}$$

We define the super cycle as cyclical components of the price series whose periodicities range from 20 to 70 years following previous studies (Heap, 2005; Cuddington & Jerrett 2008; and Erten & Ocampo, 2013b).

$$LP\_SC \equiv LP\_BP(20,\ 70) \tag{2}$$

The long-term trend is then defined as all cyclical components whose periodicities exceed 70 years, allowing the trend to evolve gradually over time:

$$LP\_T \equiv LP\_BP(70, \infty) \tag{3}$$

The remaining other short cycles can be filtered out as cycles with 2–20 year periodicities:

$$LP\_O \equiv LP\_BP(2,\ 20) \tag{4}$$

The sum of non-trend components (*LP_NT*) yields the deviation from long-term trend, or equivalently, the summation of super cycles with other shorter cycles:

$$LP\_NT \equiv LP\_BP(2,\ 20) + LP\_BP(20,\ 70) \tag{5}$$

Thus, the cycle-trend decomposition in Eq. (1) can be stated as follows:

$$LP_t \equiv LP\_T_t + LP\_SC_t + LP\_O_t$$

$$LP_t \equiv LP\_BP(70, \infty) + LP\_BP(20,\ 70) + LP\_BP(2,\ 20)$$

$$LP_t \equiv LP\_T_t + LP\_NT_t \tag{6}$$

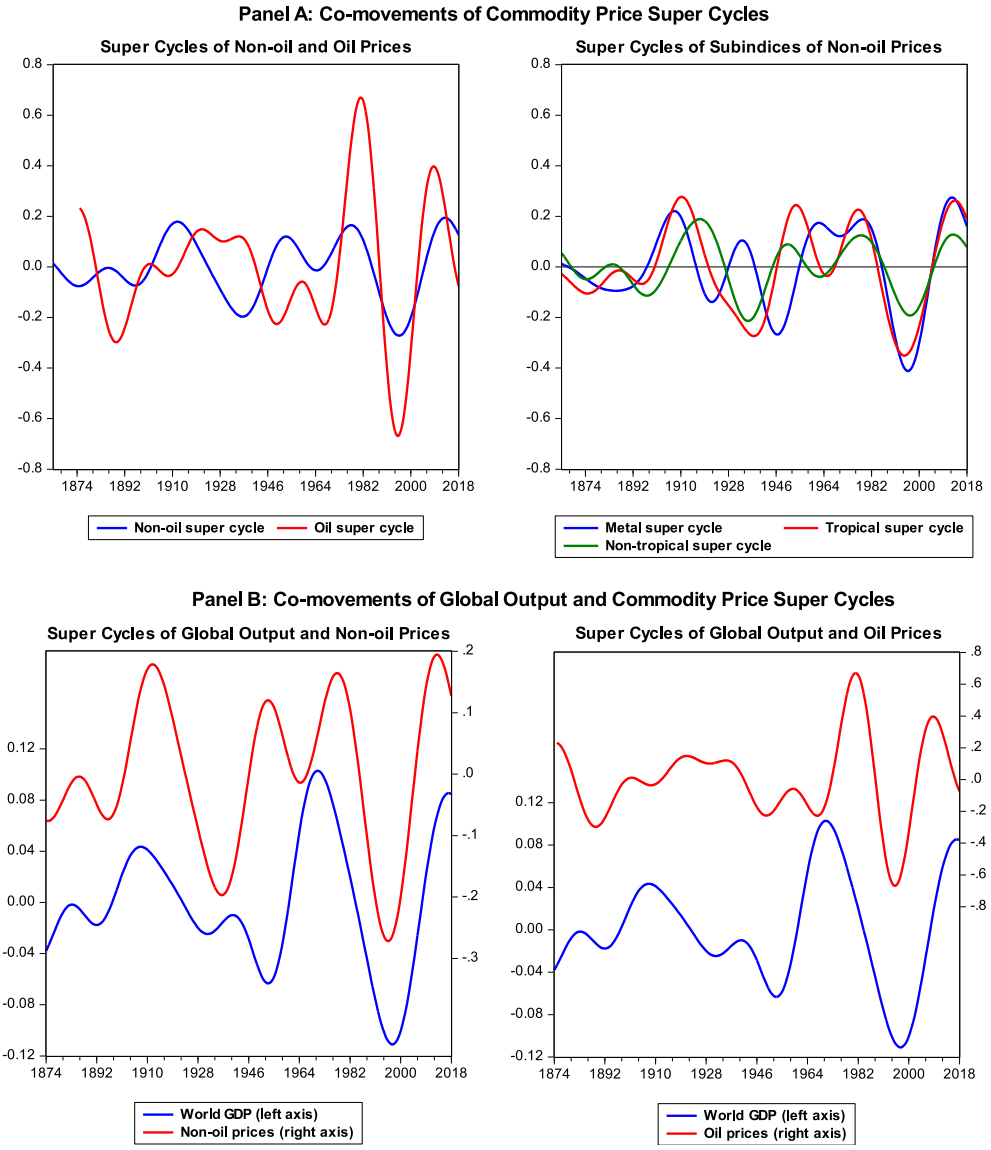

Fig. 4. Panel A shows co-movements of commodity price super cycles, where the left-side graph displays the non-oil and oil price super cycles, and the right-side graph displays the super cycles for metals, tropical and non-tropical agriculture. Panel B shows the co-movements of global output and commodity price super cycles, where the left-side graph displays the super cycles for global output and non-oil prices and the right-side graph displays the super cycles for global output and oil prices. For details on the data sources and methodology, please see text.

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